

## **Magnetism of Thin Lanthanide Metal Films**

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The magnetic properties and the electronic structure of thin films can substantially deviate from the respective bulk materials, a well-known example being the reduced Curie temperature of ferromagnetic thin films. In case of the lanthanides, many fascinating properties arise from the interaction of the local 4f states with the conduction states, resulting in electron correlation effects and complex magnetic ordering. Such phenomena will be discussed for the example of epitaxial films grown in situ in ultrahigh vacuum (UHV), combining photoelectron spectroscopy with scattering techniques to explore their temperature-dependent electronic structure in connection with magnetic ordering.

The talk will emphasize recent advances in resonant magnetic soft x-ray scattering. This technique is particularly useful in case of the lanthanides due to the high magnetic sensitivity and the strong, tunable photon absorption at the M<sub>4,5</sub> resonances. Applications are finite-size effects and reduced ordering temperatures of helical magnetic structures as well as magnetic depth profiling. These latter experiments were carried out at the Berlin synchrotron BESSY with a newly developed UHV diffractometer.